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The Court held a claim construction hearing on December 18, 2019.

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I. BACKGROUND

Plaintiff alleges infringement of United States Patents No. 6,463,092 (“the ’092 Patent”), 7,158,593 (“the ’593 Patent”), and 7,627,044 (“the ’044 Patent”). (Dkt. No. 59, Exs. A–C).

The ’092 Patent, titled “System and Method for Sending and Receiving Data Signals over a Clock Signal Line,” issued on October 8, 2002, and bears an earliest priority date of September 10, 1998. Plaintiff submits that the ’092 Patent “relates generally to the field of data communications and involves the transmission of clock and data signals, including the transmission of clock signals and data signals on the same transmission line.” (Dkt. No. 59, at 3.)

The Abstract of the ’092 Patent states:

The system preferably includes a unique transmitter that sends both clock and data signals over the same transmission line. The receiver uses the same transmission line to send data signals back to the transmitter. The transmitter comprises a clock generator, a decoder and a line interface. The clock generator produces a clock signal that includes a variable position falling edge. The falling edge position is decoded by the receiver to extract data from the clock signal. The receiver comprises a clock re-generator, a data decoder and a return channel encoder. The clock re-generator monitors the transmission line, receives signals, filters them and generates a clock signal at the receiver from the signal on the transmission line. The return channel encoder generates signals and asserts them on the transmission line. The signal is asserted or superimposed over the clock & data signal provided by the transmitter.

The ’593 Patent, titled “Combining a Clock Signal and a Data Signal,” issued on January 2, 2007, and bears an earliest priority date of March 16, 2001. Plaintiff submits that the ’593 Patent “relates generally to transmitting clock and data signals.” (Dkt. No. 59, at 5.) The Abstract of the ’593 Patent states:

A method of transmitting data in a system including at least one data channel and a separate clock channel is disclosed. The method involves combining a clock signal to be transmitted on the clock channel with a data signal to generate a combined clock and data signal. In one embodiment, the data signal has been generated from data words using an encoding scheme that shifts an energy spectrum of the data signal away from an energy spectrum of the clock signal. In another embodiment, the clock signal has a plurality of pulses each having a front edge and a back edge,

and the data signal is modulated onto the clock signal by moving at least one edge (i.e. front or back or both) of the plurality of pulses, thereby to create a combined clock and data signal.

The '044 Patent, titled "Clock-Edge Modulated Serial Link with DC-Balance Control," issued on December 1, 2009, and bears a filing date of October 31, 2005. Plaintiff submits that the '044 Patent "relates generally to the transmission of serial signals, such as in a transition minimized differential signaling system." (Dkt. No. 59, at 6.) The Abstract of the '044 Patent states:

A battery powered computing device has a channel configured as a single direct current balanced differential channel. A signal transmitter is connected to the channel. The signal transmitter is configured to apply clock edge modulated signals to the channel, where the clock edge modulated signals include direct current balancing control signals. A signal receiver is connected to the channel. The signal receiver is configured to recover the direct current balancing control signals.

The '044 Patent incorporates-by-reference the '092 Patent. '044 Patent at 3:15–18.

Shortly before the start of the December 18, 2019 hearing, the Court provided the parties with preliminary constructions with the aim of focusing the parties' arguments and facilitating discussion. Those preliminary constructions are noted below within the discussion for each term.

II. LEGAL PRINCIPLES

It is understood that "[a] claim in a patent provides the metes and bounds of the right which the patent confers on the patentee to exclude others from making, using or selling the protected invention." *Burke, Inc. v. Bruno Indep. Living Aids, Inc.*, 183 F.3d 1334, 1340 (Fed. Cir. 1999). Claim construction is clearly an issue of law for the court to decide. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 970–71 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996).

"In some cases, however, the district court will need to look beyond the patent's intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period." *Teva Pharms.*

USA, Inc. v. Sandoz, Inc., 135 S. Ct. 831, 841 (2015) (citation omitted). “In cases where those subsidiary facts are in dispute, courts will need to make subsidiary factual findings about that extrinsic evidence. These are the ‘evidentiary underpinnings’ of claim construction that we discussed in *Markman*, and this subsidiary factfinding must be reviewed for clear error on appeal.” *Id.* (citing 517 U.S. 370).

To ascertain the meaning of claims, courts look to three primary sources: the claims, the specification, and the prosecution history. *Markman*, 52 F.3d at 979. The specification must contain a written description of the invention that enables one of ordinary skill in the art to make and use the invention. *Id.* A patent’s claims must be read in view of the specification, of which they are a part. *Id.* For claim construction purposes, the description may act as a sort of dictionary, which explains the invention and may define terms used in the claims. *Id.* “One purpose for examining the specification is to determine if the patentee has limited the scope of the claims.” *Watts v. XL Sys., Inc.*, 232 F.3d 877, 882 (Fed. Cir. 2000).

Nonetheless, it is the function of the claims, not the specification, to set forth the limits of the patentee’s invention. Otherwise, there would be no need for claims. *SRI Int’l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1121 (Fed. Cir. 1985) (en banc). The patentee is free to be his own lexicographer, but any special definition given to a word must be clearly set forth in the specification. *Intellicall, Inc. v. Phonometrics, Inc.*, 952 F.2d 1384, 1388 (Fed. Cir. 1992). Although the specification may indicate that certain embodiments are preferred, particular embodiments appearing in the specification will not be read into the claims when the claim language is broader than the embodiments. *Electro Med. Sys., S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 1054 (Fed. Cir. 1994).

This Court’s claim construction analysis is substantially guided by the Federal Circuit’s decision in *Phillips v. AWH Corporation*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). In *Phillips*, the court set forth several guideposts that courts should follow when construing claims. In particular, the court reiterated that “the claims of a patent define the invention to which the patentee is entitled the right to exclude.” *Id.* at 1312 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). To that end, the words used in a claim are generally given their ordinary and customary meaning. *Id.* The ordinary and customary meaning of a claim term “is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Id.* at 1313. This principle of patent law flows naturally from the recognition that inventors are usually persons who are skilled in the field of the invention and that patents are addressed to, and intended to be read by, others skilled in the particular art. *Id.*

Despite the importance of claim terms, *Phillips* made clear that “the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Id.* Although the claims themselves may provide guidance as to the meaning of particular terms, those terms are part of “a fully integrated written instrument.” *Id.* at 1315 (quoting *Markman*, 52 F.3d at 978). Thus, the *Phillips* court emphasized the specification as being the primary basis for construing the claims. *Id.* at 1314–17. As the Supreme Court stated long ago, “in case of doubt or ambiguity it is proper in all cases to refer back to the descriptive portions of the specification to aid in solving the doubt or in ascertaining the true intent and meaning of the language employed in the claims.” *Bates v. Coe*, 98 U.S. 31, 38 (1878). In addressing the role of

the specification, the *Phillips* court quoted with approval its earlier observations from *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998):

Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim. The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction.

Phillips, 415 F.3d at 1316. Consequently, *Phillips* emphasized the important role the specification plays in the claim construction process.

The prosecution history also continues to play an important role in claim interpretation. Like the specification, the prosecution history helps to demonstrate how the inventor and the United States Patent and Trademark Office (“PTO”) understood the patent. *Id.* at 1317. Because the file history, however, “represents an ongoing negotiation between the PTO and the applicant,” it may lack the clarity of the specification and thus be less useful in claim construction proceedings. *Id.* Nevertheless, the prosecution history is intrinsic evidence that is relevant to the determination of how the inventor understood the invention and whether the inventor limited the invention during prosecution by narrowing the scope of the claims. *Id.*; see *Microsoft Corp. v. Multi-Tech Sys., Inc.*, 357 F.3d 1340, 1350 (Fed. Cir. 2004) (noting that “a patentee’s statements during prosecution, whether relied on by the examiner or not, are relevant to claim interpretation”).

Phillips rejected any claim construction approach that sacrificed the intrinsic record in favor of extrinsic evidence, such as dictionary definitions or expert testimony. The *en banc* court condemned the suggestion made by *Texas Digital Systems, Inc. v. Telegenix, Inc.*, 308 F.3d 1193 (Fed. Cir. 2002), that a court should discern the ordinary meaning of the claim terms (through dictionaries or otherwise) before resorting to the specification for certain limited purposes. *Phillips*, 415 F.3d at 1319–24. According to *Phillips*, reliance on dictionary definitions at the

expense of the specification had the effect of “focus[ing] the inquiry on the abstract meaning of words rather than on the meaning of claim terms within the context of the patent.” *Id.* at 1321. *Phillips* emphasized that the patent system is based on the proposition that the claims cover only the invented subject matter. *Id.*

Phillips does not preclude all uses of dictionaries in claim construction proceedings. Instead, the court assigned dictionaries a role subordinate to the intrinsic record. In doing so, the court emphasized that claim construction issues are not resolved by any magic formula. The court did not impose any particular sequence of steps for a court to follow when it considers disputed claim language. *Id.* at 1323–25. Rather, *Phillips* held that a court must attach the appropriate weight to the intrinsic sources offered in support of a proposed claim construction, bearing in mind the general rule that the claims measure the scope of the patent grant.

The Supreme Court of the United States has “read [35 U.S.C.] § 112, ¶ 2 to require that a patent’s claims, viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910, 134 S. Ct. 2120, 2129 (2014). “A determination of claim indefiniteness is a legal conclusion that is drawn from the court’s performance of its duty as the construer of patent claims.” *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1347 (Fed. Cir. 2005) (citations and internal quotation marks omitted), *abrogated on other grounds by Nautilus*, 134 S. Ct. 2120. “Indefiniteness must be proven by clear and convincing evidence.” *Sonix Tech. Co. v. Publ’ns Int’l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017).

III. AGREED TERMS

The parties submitted the following agreements in their August 14, 2019 P.R. 4-3 Joint Claim Construction and Prehearing Statement (Dkt. No. 47) and in their October 30, 2019 P.R. 4-5(d) Joint Claim Construction Chart (Dkt. No. 69, at 2):

<u>Term</u>	<u>Agreed Construction</u>
“clock signal” <ul style="list-style-type: none">• ’092 Patent, Claim 1;• ’593 Patent, Claims 34, 35;• ’044 Patent, Claims 1, 8, 13	“signal with uses that include timing or synchronization”
“the clock signal is pulse width modulated” <ul style="list-style-type: none">• ’044 Patent, Claims 1, 13	plain and ordinary meaning
“pulse width modulated clock signal” <ul style="list-style-type: none">• ’044 Patent, Claims 8, 13	plain and ordinary meaning
“data words” <ul style="list-style-type: none">• ’593 Patent, Claim 34	plain and ordinary meaning
“effective loop bandwidth of a clock recovery block” <ul style="list-style-type: none">• ’593 Patent, Claim 34	“frequency pass range of a clock recovery block”
“duty cycle” <ul style="list-style-type: none">• ’044 Patent, Claims 2, 3	“the ratio of a pulse width to a period”
“duty cycle position” <ul style="list-style-type: none">• ’044 Patent, Claims 2, 3	“specified ratio of a pulse width to a period”

IV. DISPUTED TERMS IN MULTIPLE PATENTS

A. “control signal”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
Plain and ordinary meaning Alternatively: “a signal that controls”	“a signal that controls processing of data” ³

(Dkt. No. 47, Ex. A, at 1; Dkt. No. 59, at 8; Dkt. No. 64, at 15; Dkt. No. 69, at 4.) The parties submit that this term appears in Claim 1 of the ’092 Patent and Claims 1, 8, and 13 of the ’044 Patent. (Dkt. No. 47, Ex. A, at 1; Dkt. No. 69, at 4.)

Shortly before the start of the December 18, 2019 hearing, the Court provided the parties with the following preliminary construction: “a signal, distinct from the data signal, that controls some aspect of transmission.”

(1) The Parties’ Positions

Plaintiff argues that “[i]nstead of tracking the plain and ordinary meaning, Defendants’ construction attempts to import many limitations into the term ‘control signal.’” (Dkt. No. 59, at 9.) Plaintiff also submits that “when the inventors intended to include a transmitter and receiver in their claims, they explicitly recited both a transmitter and receiver in the claims,” and Plaintiff urges that Defendants’ proposal would improperly “constru[e] a non-functional term in an apparatus claim as requiring a particular later use.” (*Id.*, at 9 & 10.)

Defendants respond that “Defendants’ construction clearly distinguishes a ‘control signal’ from other types of signals in the claims, such as a ‘data signal,’ which does not control how data is processed but instead transmits data.” (Dkt. No. 64, at 16.) Defendants point to the phrase

³ Defendants previously proposed: “signal sent between a transmitter and a receiver to control processing of data.” (Dkt. No. 47, Ex. A, at 1.)

“clock, data and control signals” in the claims, as well as in the specification, as evidence that these are three different types of signals. (*Id.*) Further, Defendants argue that “[a] ‘control signal’ is also sent separately from data signals, either at separate time blocks or on separate signal lines.” (*Id.*, at 17.) Finally, Defendants argue that Plaintiff’s proposal “is broad enough to encompass a ‘data signal’” and “is incomplete for failing to specify what the ‘control signal’ is actually controlling.” (*Id.*, at 18.)

Plaintiff replies that “the term ‘control signal’ is a broad term, and reading-in a limitation that the signal must control ‘processing of data’ excludes its full scope.” (Dkt. No. 67, at 2.) Plaintiff submits that “Defendants do not cite to any statement of lexicography or disavowal to support that added limitation.” (*Id.*, at 1.)

At the December 18, 2019 hearing, Defendants were amenable to the Court’s preliminary construction. Plaintiff disagreed with “controls some aspect of transmission,” arguing that a control signal could be any signal, modulated onto a carrier, that is not a data signal. Plaintiff cited various disclosures in the specification, arguing that a control signal can be used for various purposes. *See* ’044 Patent at 1:25–36; *see also* ’092 Patent at 6:28–30. Plaintiff also suggested replacing “controls” (in the Court’s preliminary construction) with “can control” or “configured to control.” Defendants responded that other claim language already recites “configured to.”

(2) Analysis

As a threshold matter, Plaintiff cites the claim construction analysis of various courts regarding “control signal” in other patents,⁴ but such citations are of minimal persuasive weight,

⁴ (Dkt. No. 69, at 8–9):

Many Courts have already construed the term “control signal” as plain and ordinary meaning or with a construction such as “a signal that controls.” *See, e.g., Personalized Media Commc’ns, LLC v. Apple, Inc.*, C.A. No. 2:15-cv-01206, 2016 WL 6299860, at *46 (E.D. Tex. Oct. 26, 2016) (“The Court construes ‘control

if any, because “claims of unrelated patents must be construed separately.” *e.Digital Corp. v. Futurewei Techs., Inc.*, 772 F.3d 723, 727 (Fed. Cir. 2014).

Plaintiff also cites an extrinsic telecommunications dictionary that defines “control signal” as follows:

1. In the public network, control signals are used for auxiliary functions in both customer loop signaling and interoffice trunk signaling. Control signals are used in the customer loop for Coin Collect and Coin Return and Party Identification. Control signals used in interoffice trunk signaling include Start Dial (Wink or Delay Dial) signals, Keypulse (KP) signals or Start Pulse (ST) signals.
2. In modem communications, control signals are modem interface signals used to announce, start, stop or modify a function. Here’s a table showing common RS-232-C and ITU-T V.24 control signals

(Dkt. No. 59, Ex. E, *Newton’s Telecom Dictionary* 151–52 (11th ed. 1996).)

Plaintiff fails to demonstrate that this extrinsic telecommunications definition of “control signal” is applicable in the context of the patents-in-suit. Further, even assuming that this definition is applicable, this definition at least arguably supports Defendants’ proposal that control signals relate to processing data, especially as discussed in the definition regarding “modem communications.” *Id.*

signal’ to mean ‘a signal that controls.’”); *Personalized Media Commc’n, LLC v. Motorola, Inc.*, No. 2:08-CV-70, 2011 WL 4591898, at *26 (E.D. Tex. Sept. 30, 2011) (“The court agrees with PMC that attempting to construe this simple and straightforward phrase is more likely to confuse, not assist, the jury. As such, the court construes the term ‘control signal’ and the associated term ‘signal which controls said receiver’ to have their plain and ordinary meaning.”); *Digi Int’l, Inc. v. Lantronix, Inc.*, 402 F. Supp. 2d 1041, 1052 (D. Minn. 2005) (“The Court agrees that the phrase ‘generate device control signals’ needs very little construction. The Court finds that the plain meaning of the term to a person of ordinary skill in the art would be that the software enables the client machine ‘to generate signals that control the device.’”); *see also Nordyne Inc. v. RBC Mfg. Corp.*, C.A. No. 4:09-cv-00203, 2011 WL 403213, at *7 (E.D. Mo. Feb. 2, 2011); *Power Integrations, Inc. v. ON Semiconductor Corp.*, C.A. No. 16-cv-06371, 2018 WL 5603631, at *15 (N.D. Cal. Oct. 26, 2018).

Turning to the patents-in-suit, Claim 1 of the '092 Patent, for example, recites (emphasis added):

1. An apparatus for transmitting a clock signal and data signals over a signal line, the apparatus comprising a clock generator having a first input, a second input and an output, the clock generator modulating a falling edge of an output signal to indicate different data values, the first input of the clock generator coupled to receive a clock signal, and the second input of the clock generator coupled to receive *a control signal indicating a data value to be transmitted*.

The surrounding language in this claim, which refers to “indicating a data value to be transmitted,” is consistent with Defendants’ proposal that a “control signal” relates to processing data. Yet, to whatever extent this could be interpreted as meaning that the term “control signal” is limited to signals that control processing of data, the express recital of “indicating a data value to be transmitted” weighs at least somewhat against such a narrow interpretation of “control signal.” In other words, that a particular “control signal” is related to processing data does not mean that *all* “control signals” are necessarily so limited.

Defendants urge that the recital of “clock, data and control signals” in claims of the '044 Patent evinces that there are three different types of signals, namely clock signals, data signals, and control signals. Indeed, as Defendants properly submit, “different claim terms are presumed to have different meanings.” *Helmsderfer v. Bobrick Washroom Equip., Inc.*, 527 F.3d 1379, 1382 (Fed. Cir. 2000).

But even accepting that “control signals” are distinct from clock signals and data signals, it does not necessarily follow that “control signals” must control processing of data. Defendants fail to show otherwise, although Defendants cite various disclosures in the specification. (*See* Dkt. No. 64, at 16–17 (citing '044 Patent at 1:25–31 (discussing mobile device interface including “22 lines with 18-bit video pixel data lines and *control signal* lines, such as dot-clock, data enable (DE), horizontal sync (HSYNC), vertical sync (VSYNC), and other display-specific configuration

settings”) (emphasis added), 1:48–49 (“it would be desirable to remove the dedicated clock channel and use only a single channel for transmitting the clock, data and control signals”), 1:56–59 (“it would be desirable to provide a low-power mobile device with a serial channel that supports clock, data and control signals, such as DC balancing control signals”), 3:1–3 (“The invention provides techniques to transfer a clock signal, data and control signals over a single channel.”), 3:56–59 (“For example, the *data* may be 6 bits of red pixel data, 6 bits of green pixel data, and 6 bits of blue pixel data. The *control signals* may include HSYNC, VSYNC, and DE signals.”) (emphasis added) & Fig. 3; ’092 Patent at 1:47–50 (“most systems include a variety of control signals that must be sent between the transmitter and the receiver to ensure proper operation, and maintain synchronization between the transmitter and the receiver”) & 1:58–60 (“in video data communication, much of the *data* must be transmitted in blocks during which *control signals* cannot be sent”) (emphasis added)).)

The specification disclosures cited by Defendants are simply consistent with what is already apparent in the claim language set forth above, namely that clock, data, and control signals are distinct from one another. *See Helmsderfer*, 527 F.3d at 1382 (quoted above); *see also Becton, Dickinson & Co. v. Tyco Healthcare Grp., LP*, 616 F.3d 1249, 1254 (Fed. Cir. 2010) (“Where a claim lists elements separately, the clear implication of the claim language is that those elements are distinct component[s] of the patented invention.”) (citations and internal quotation marks omitted). Of note, however, this does not necessarily prohibit a “control signal” from overlapping with another signal. *Cf. Linear Tech. Corp. v. Int’l Trade Comm’n*, 566 F.3d 1049, 1055 (Fed. Cir. 2009) (“there is nothing in the claim language or specification that supports narrowly construing the terms to require a specific structural requirement or entirely distinct ‘second’ and ‘third’ circuits”).

The Court therefore rejects Defendants’ proposal of “a signal that controls processing of data.” At the December 18, 2019 hearing, both sides discussed an extrinsic technical dictionary, cited by Defendants, that includes a definition of “control signal” as: “Any signal that purposely affects the recording, processing, transmission or interpretation of data by a system element.” (Dkt. No. 64, Ex. 4, *The IEEE Standard Dictionary of Electrical and Electronics Terms* 218 (6th ed. 1996).) At the hearing, both sides discussed broadening the Court’s preliminary construction to encompass recording, processing, and interpretation as well as transmission.

The Court accordingly hereby construes **“control signal”** to mean **“a signal, distinct from the data signal, that controls some aspect of recording, processing, transmission, or interpretation.”**

B. “channel”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
Plain and ordinary meaning Alternatively, should the Court determine that this term requires construction: “a path along which a signal can be sent”	“a path between a transmitter and a receiver along which a signal can be sent”

(Dkt. No. 47, Ex. A, at 5; Dkt. No. 59, at 10; Dkt. No. 64, at 21; Dkt. No. 69, at 7.) The parties submit that this term appears in Claim 34 of the ’593 Patent and Claims 1, 8, 9, 13, and 19 of the ’044 Patent. (Dkt. No. 47, Ex. A, at 5; Dkt. No. 69, at 7.)

Shortly before the start of the December 18, 2019 hearing, the Court provided the parties with the following preliminary construction: “a path along which a signal can be sent.”

(1) The Parties' Positions

Plaintiff submits a technical dictionary definition and also argues that “Defendants have unjustifiably added the limitations of both a transmitter and receiver into claims that do not require them.” (Dkt. No. 59, at 11.)

Defendants respond that Plaintiff’s proposed interpretation is overbroad because it “would allow a ‘channel’ to encompass a path internal to a transmitter or a receiver.” (Dkt. No. 64, at 22.) Defendants argue that “[i]n view of the claim language, the specifications’ characterization of the claimed ‘invention’ as a whole, the specifications’ repeated consistent usage of the term, and inventor testimony, ‘channel’ must refer to a path ‘between a transmitter and a receiver.’” (*Id.*, at 25.)⁵

Plaintiff replies that “[w]hen the inventors intended to include the requirement of both a transmitter and a receiver, they explicitly recited both a transmitter and a receiver *in the claims*.” (Dkt. No. 67, at 2.) Plaintiff also argues that “the Summary of the Invention section does not include any specific language that requires that any time the term ‘channel’ appears in a claim, so must the limitations of a transmitter and a receiver.” (*Id.*, at 3.)

At the December 18, 2019 hearing, Plaintiff agreed with the Court’s preliminary construction. Defendants responded by proposing that the term “channel” makes sense only in the context of an output of a transmitter or an input of a receiver. Defendants reiterated that a “channel” cannot be entirely within a transmitter or entirely within a receiver.

⁵ Defendants also submit deposition testimony of one of the named inventors, Gyudong Kim, that a “channel” is an electrical signal path between a transmitter and a receiver. (*See* Dkt. No. 64, Ex. 1, Aug. 21, 2019 G. Kim dep. at 92:5–9 & 222:9–223:1.) Such testimony is of little, if any, relevance in these claim construction proceedings. *See Howmedica Osteonics Corp. v. Wright Med. Tech., Inc.*, 540 F.3d 1337, 1346–47 (Fed. Cir. 2008) (noting that inventor testimony is “limited by the fact that an inventor understands the invention but may not understand the claims, which are typically drafted by the attorney prosecuting the patent application”).

(2) Analysis

Plaintiff submits a technical dictionary that sets forth various definitions of “channel” in various contexts, including a definition of “channel” as meaning “a path along which signals can be sent.” (Dkt. No. 59, Ex. F, *The IEEE Standard Dictionary of Electrical and Electronics Terms* 323 (6th ed. 1996).) Defendants do not appear to challenge this interpretation of “channel” as a general matter, as demonstrated by the similarities in the parties’ proposed constructions.

Instead, the parties dispute whether a “channel” in the patents-in-suit must be “between a transmitter and a receiver.” Such a requirement is evident in Claim 13 of the ’044 Patent, which expressly recites a “signal transmitter configured to apply the multiplexed signals to the channel” and a “signal receiver configured to de-multiplex the clock, data and control signals from the channel node.” Claim 34 of the ’593 Patent and Claims 1, 8, 9, and 19 of the ’044 Patent, by contrast, are different in this regard. Claim 34 of the ’593 Patent, for example, recites (emphasis added):

34. A method of transmitting data in a system including at least one data *channel* and a separate clock *channel*, the method comprising:

combining a clock signal to be transmitted on the clock *channel* with an encoded data signal having a plurality of encoded data words to generate a combined clock and encoded data signal;

the clock signal having a plurality of pulses and each pulse having a front edge and a back edge and a pulse width defined by the time difference of the front edge and back edge;

the combining further including encoding an unencoded data to generate an encoded data and modulating the encoded data onto the clock signal based on the encoded data by: (i) moving the front edge only of a particular pulse, (ii) moving the back edge only of a particular pulse, or (iii) moving both the front edge and the back edge of a particular pulse by different amounts or in different directions, wherein the movement in any of the cases causing a change in a change in the width of the particular pulse and the moving of at least one edge is effective to combine the encoded data signal onto the clock signal; and

transmitting the combined clock and encoded data signal on the clock *channel*;

wherein the encoded data signal is generated from the unencoded data words using an encoding scheme that shifts an energy spectrum of the combined

clock and encoded data signal away from an effective loop band width of a clock recovery block.

Claim 1 of the '044 Patent likewise recites only a transmitter. Claim 8 of the '044 Patent recites only a receiver. Claims 9 and 19 of the '044 Patent depend from Claims 8 and 13, respectively.

Defendants point to the Summary of the Invention of the '044 Patent, which refers to “[t]he invention” as including a transmitter and a receiver connected to a channel (*see* '044 Patent at 1:63–2:18), but this disclosure reflects no clear intent to define the claimed invention as a whole or to narrowly define the term “channel.” *See, e.g., Honeywell Int’l, Inc. v. ITT Indus., Inc.*, 452 F.3d 1312, 1318 (Fed. Cir. 2006) (“the written description refers to the fuel filter as ‘this invention’ or ‘the present invention’”); *Blackbird Tech LLC v. ELB Elecs., Inc.*, 895 F.3d 1374, 1378 n.2 (Fed. Cir. 2018) (“The Summary of the Invention often spans many paragraphs, columns, or even pages. In cases where we have held limitations ought to be read in, it was not simply because those limitations appeared in the Summary of the Invention. There was specific language that made clear those limitations were important to the claimed invention.”) (citation omitted).

Defendants also fail to demonstrate that the specifications define the term “by implication.” *Bell Atl. Network Servs., Inc. v. Covad Commc’ns Grp, Inc.*, 262 F.3d 1258, 1271 (Fed. Cir. 2001) (“when a patentee uses a claim term throughout the entire patent specification, in a manner consistent with only a single meaning, he has defined that term by implication”). Defendants point to disclosures in which a “channel” is a path through which a transmitter sends signals to a receiver. *See, e.g.,* '044 Patent at Abstract (“[a] signal transmitter is connected to the channel” and “is configured to apply . . . signals to the channel” and “[a] signal receiver is connected to the channel” and “is configured to recover the . . . signals”), 3:53–4:11 & 4:36–51; '593 Patent at 5:26–36, 7:4–10, 6:21–7:30, 10:53–11:18 & Fig. 1.

Defendants’ proposed construction, however, would appear to require not only the presence of the path but also the presence of a transmitter and the presence of a receiver. Such an interpretation is disfavored by the above-cited claims, some of which refer to only a transmitter or only a receiver. The *Ruckus Wireless* case cited by Defendants is therefore unpersuasive. *See Ruckus Wireless, Inc. v. Innovative Wireless Solutions, LLC*, 824 F.3d 999, 1003–04 (Fed. Cir. 2016) (“every embodiment described in the specification utilizes a telephone wire, and . . . [t]hough these statements do not expressly exclude wireless communications from the meaning of ‘communications path,’ they do not include it, and they discourage that understanding”).

Nonetheless, the parties essentially agree that a “channel” exists in the context of a transmitter or a receiver. This understanding is consistent with disclosures in the specification. *See, e.g.*, ’044 Patent at 1:63–2:4. The Court rejects Defendants’ proposal of “between a transmitter and a receiver” and instead refers to a channel being a path for sending toward a receiver or receiving from a transmitter. This interpretation also reflects the substantial agreement apparent among the parties at the December 18, 2019 hearing that a “channel” is a path and does not itself include a transmitter or a receiver.

The Court accordingly hereby construes “**channel**” to mean “**a path along which a signal can be sent toward a receiver or can be received from a transmitter.**” In adopting this construction, the Court expressly relies upon the apparent understanding between the parties that a “channel” does not itself need to include a transmitter or a receiver.

V. DISPUTED TERMS IN THE ’092 PATENT

C. “An apparatus for transmitting a clock signal and data signals over a signal line”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
Non-limiting preamble, no construction necessary	Preamble limiting.

(Dkt. No. 47, Ex. A, at 1; Dkt. No. 59, at 11; Dkt. No. 64, at 9; Dkt. No. 69, at 10.) The parties submit that this term appears in Claim 1 of the '092 Patent. (Dkt. No. 47, Ex. A, at 1; Dkt. No. 69, at 10.)

Shortly before the start of the December 18, 2019 hearing, the Court provided the parties with the following preliminary construction: “Preamble limiting.”

(1) The Parties’ Positions

Plaintiff argues that “the preamble states merely a purpose or intended use of the invention, *i.e.*, ‘for transmitting a clock signal data signals over a signal line,’” and “the claim body defines a structurally complete invention.” (Dkt. No. 59, at 12.) Plaintiff also notes that “the preamble does not provide antecedent basis for any terms in the body of the claims” and that “the inventors did not rely on the preamble in the prosecution to distinguish over prior art.” (*Id.*)

Defendants respond that Plaintiff “fails to address asserted Claim 2, which recites ‘the signal line’ — an essential structural component that finds antecedent basis only in the preamble of Claim 1’s recitation of ‘a signal line.’” (Dkt. No. 64, at 9.) Defendants argue that the “signal line” is essential to the claims and is set forth in the specification as being essential to the claimed invention. (*Id.*, at 10.)

Plaintiff replies that “the caselaw does not suggest that simply because a preamble provides antecedent basis for a term in a *dependent* claim, that the preamble must also be limiting as to an independent claim *for which it does not provide any antecedent basis.*” (Dkt. No. 67, at 4.)

(2) Analysis

In general, a preamble limits the invention if it recites essential structure or steps, or if it is “necessary to give life, meaning, and vitality” to the claim. *Pitney Bowes[, Inc. v. Hewlett-Packard Co.]*, 182 F.3d [1298,] 1305 [(Fed. Cir. 1999)]. Conversely, a preamble is not limiting “where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose

or intended use for the invention.” *Rowe v. Dror*, 112 F.3d 473, 478, 42 USPQ2d 1550, 1553 (Fed. Cir. 1997).

Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc., 289 F.3d 801, 808 (Fed. Cir. 2002); *see, e.g., Eaton Corp. v. Rockwell Int’l Corp.*, 323 F.3d 1332, 1339 (Fed. Cir. 2003) (“When limitations in the body of the claim rely upon and derive antecedent basis from the preamble, then the preamble may act as a necessary component of the claimed invention.”); *C.W. Zumbiel Co. v. Kappos*, 702 F.3d 1371, 1385 (Fed. Cir. 2012) (finding preambles limiting because “‘containers’ as recited in the claim body depend on ‘a plurality of containers’ in the preamble as an antecedent basis”).

Also, “the purpose or intended use of the invention . . . is of no significance to claim construction” *See Pitney Bowes*, 182 F.3d at 1305. This principle has sometimes been characterized as “the presumption against reading a statement of purpose in the preamble as a claim limitation.” *Marrin v. Griffin*, 599 F.3d 1290, 1294–95 (Fed. Cir. 2010); *see Allen Eng’g Corp. v. Bartell Indus.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002) (“Generally, the preamble does not limit the claims.”); *see also Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 769–71 (Fed. Cir. 2018) (in preamble reciting “[a] computer network for providing an information delivery service for a plurality of participants,” finding “information delivery service” to be non-limiting because it “merely describe[s] intended uses for what is otherwise a structurally complete invention”).

In some cases, language in the preamble may be merely “descriptive” of the limitations set forth in the body of the claim. *See IMS Tech., Inc. v. Haas Automation, Inc.*, 206 F.3d 1422, 1434 (Fed. Cir. 2000) (“The phrase ‘control apparatus’ in the preamble merely gives a descriptive name to the set of limitations in the body of the claim that completely set forth the invention.”); *see also Deere & Co. v. Bush Hog, LLC*, 703 F.3d 1349, 1358 (Fed. Cir. 2012) (“if the body of the claim describes a structurally complete invention, a preamble is not limiting where it ‘merely gives a

name’ to the invention, extols its features or benefits, or describes a use for the invention”) (quoting *Catalina*, 289 F.3d at 809).

Claims 1 and 2 of the ’092 Patent recite (emphasis added):

1. *An apparatus for transmitting a clock signal and data signals over a signal line*, the apparatus comprising a clock generator having a first input, a second input and an output, the clock generator modulating a falling edge of an output signal to indicate different data values, the first input of the clock generator coupled to receive a clock signal, and the second input of the clock generator coupled to receive a control signal indicating a data value to be transmitted.
2. The apparatus of claim 1, further comprising a data decoder for extracting data signals, the data decoder having an input and an output, the data decoder for extracting data signals, the input of the data decoder coupled to *the signal line*, the output providing data from *the signal line*.

Thus, the recital of “a signal line” in the preamble of Claim 1 provides antecedent basis for the recital of “the signal line” in Claim 2. At the December 18, 2019 hearing, Plaintiff conceded that the preamble is limiting as to Claim 2.

As to Claim 1, Plaintiff cites authority for the proposition that a preamble of an independent claim need not be found limiting for the independent claim simply because the preamble provides antecedent basis for terms appearing in the body of a dependent claim. *See CreAgri, Inc. v. PinnacLife Inc.*, No. 11-CV-06635-LHK, 2013 WL 1663611, at *8 (N.D. Cal. Apr. 16, 2013) (Koh, J.). Defendants argue that “the ‘signal line’ is an essential structure of the claimed invention because it is through the ‘signal line’ that the ‘apparatus for transmitting’ in Claim 1 actually transmits its combined clock and data signal.” (Dkt. No. 64, at 11.)

On one hand, one of the authorities cited by Plaintiff concluded that the preamble of the independent claim was limiting as to the dependent claim but *not* as to the independent claim. *TQ Delta, LLC v. 2WIRE, Inc.*, No. 1:13-CV-01835-RGA, 2018 WL 4062617, at *5 (D. Del. Aug. 24, 2018) (Andrews, J.) (“neither party objected to the idea that a preamble could be construed as

limiting a dependent claim, but not limiting the independent claim in which it appears”). This approach appears to comport with the general principle, for example, that “[e]ach claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims.” 35 U.S.C. § 282.

On the other hand, another one of the authorities cited by Plaintiff notes that even though there is no “bright-line rule,” a preamble term providing antecedent basis for a dependent claim “support[ed] the Court’s conclusion” that the preamble of the independent claim was limiting. *PersonalWeb Techs. LLC v. Int’l Bus. Machines Corp.*, No. 16-CV-01266-EJD, 2017 WL 2180980, at *13, n.15 (N.D. Cal. May 18, 2017) (Davila, J.).

Here, the recitals of “signal line” in above-reproduced Claims 1 and 2 do not merely provide “reference points . . . that aid in defining” the claimed invention. *C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340, 1350 (Fed. Cir. 1998). Instead, in order to give “life, meaning, and vitality” to the “output signal” recited in the body of Claim 1, the preamble of Claim 1 must be limiting. *Pitney Bowes*, 182 F.3d at 1305. This understanding is consistent with disclosures in the specification. *See, e.g.*, ’092 Patent at 3:55–62 (referring to Figure 1, “system 100 including the combined clock and data signal line of the present invention is shown”; “The transmitter 102 preferably provides a clock signal as well as data signals to the receiver 106 via the clock transmission line 104”); *Proveris Sci. Corp. v. Innovasys, Inc.*, 739 F.3d 1367, 1372 (Fed. Cir. 2014) (“A preamble is generally construed to be limiting if it ‘recites essential structure or steps’ . . . that are highlighted as important by the specification.”); *see id.* at 1373.

At the December 18, 2019 hearing, Plaintiff expressed concern that finding the preamble limiting would create confusion by potentially requiring three different types of signals on the signal line, namely a “clock signal,” “data signals,” and an “output signal.” In finding the preamble

limiting, the Court notes that the manner in which the “clock signal” and the “data signals” are transmitted over a “signal line” (as recited by the preamble) is by the clock generator modulating a falling edge of the clock signal to indicate different data values in an output signal. Thus, reading Claim 1 of the ’092 Patent as a whole, the only type of signal required to be transmitted on the signal line is an output signal.

The Court therefore hereby finds that **the preamble of Claim 1 of the ’092 Patent is limiting.**

D. “the clock generator modulating a falling edge of an output signal to indicate different data values”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
Plain and ordinary meaning	Indefinite Alternatively: “the clock generator modulating a falling edge of the clock signal to indicate different data values in an output signal”

(Dkt. No. 47, Ex. A, at 3; Dkt. No. 59, at 13; Dkt. No. 64, at 11; Dkt. No. 69, at 11.) The parties submit that this term appears in Claim 1 of the ’092 Patent. (Dkt. No. 47, Ex. A, at 3; Dkt. No. 69, at 11.)

Shortly before the start of the December 18, 2019 hearing, the Court provided the parties with the following preliminary construction: “the clock generator modulating a falling edge of the clock signal to indicate different data values in an output signal.”

At the December 18, 2019 hearing, the parties reached agreement that this disputed term means: “the clock generator modulating a falling edge of the clock signal input to the clock generator to indicate different data values in an output signal.”

The Court accordingly hereby construes **“the clock generator modulating a falling edge of an output signal to indicate different data values”** to mean **“the clock generator modulating a falling edge of the clock signal input to the clock generator to indicate different data values in an output signal.”**

VI. DISPUTED TERMS IN THE '593 PATENT

E. “clock channel”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
Plain and ordinary meaning Alternatively, should the Court determine that this term requires construction: “a path along which a signal carrying clock information can be sent”	“channel dedicated to transmitting a signal that is or includes a clock signal”

(Dkt. No. 47, Ex. A, at 7; Dkt. No. 59, at 15; Dkt. No. 64, at 25; Dkt. No. 69, at 12.) The parties submit that this term appears in Claim 34 of the '593 Patent. (Dkt. No. 47, Ex. A, at 7; Dkt. No. 69, at 12.)

Shortly before the start of the December 18, 2019 hearing, the Court provided the parties with the following preliminary construction: “a channel for carrying a clock signal or a signal that includes a clock signal (such as a combined clock and data signal).”

At the December 18, 2019 hearing, the parties agreed with the Court’s preliminary construction.

The Court therefore hereby construes **“clock channel”** to mean **“a channel for carrying a clock signal or a signal that includes a clock signal (such as a combined clock and data signal).”**

F. “shifts an energy spectrum of the combined clock and encoded data signal away from an effective loop bandwidth of a clock recovery block”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
Plain and ordinary meaning Alternatively, should the Court determine that this term requires construction: “shifts an energy spectrum of the combined clock and encoded data signal away from the pass range of a clock recovery block”	Indefinite

(Dkt. No. 47, Ex. A, at 7; Dkt. No. 59, at 17; Dkt. No. 64, at 30.) The parties submit that this term appears in Claim 34 of the ’593 Patent. (Dkt. No. 47, Ex. A, at 7.)

“Since Plaintiff filed its opening brief, the parties have agreed to a construction for this term that reads: ‘shifts an energy spectrum of the combined clock and encoded data signal away from the pass range of a clock recovery block.’” (Dkt. No. 64, at 30.) At the December 18, 2019 hearing, the parties confirmed their agreement in this regard.

The Court therefore hereby construes **“shifts an energy spectrum of the combined clock and encoded data signal away from an effective loop bandwidth of a clock recovery block”** to mean **“shifts an energy spectrum of the combined clock and encoded data signal away from the pass range of a clock recovery block.”**

G. “A method of transmitting data in a system including at least one data channel and a separate clock channel”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
Non-limiting preamble, no construction necessary	Preamble limiting

(Dkt. No. 47, Ex. A, at 4; Dkt. No. 59, at 22; Dkt. No. 64, at 19.) The parties submit that this term appears in Claim 34 of the ’593 Patent. (Dkt. No. 47, Ex. A, at 4.)

In its reply brief, Plaintiff submits: “For purposes of this case only, Plaintiff concedes that this preamble is limiting.” (Dkt. No. 67, at 7.) At the December 18, 2019 hearing, the parties confirmed their agreement in this regard.

Because Plaintiff thus no longer challenges Defendants’ proposal, the Court hereby finds that **the preamble of Claim 34 of the ’593 Patent is limiting.**

VII. DISPUTED TERMS IN THE ’044 PATENT

H. “direct current balancing control signals”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
Plain and ordinary meaning Alternatively, should the Court determine that this term requires construction: “signals associated with direct current balancing”	Indefinite

(Dkt. No. 47, Ex. A, at 9; Dkt. No. 59, at 25; Dkt. No. 64, at 1; Dkt. No. 69, at 14.) The parties submit that this term appears in Claims 1, 8, and 13 of the ’044 Patent. (Dkt. No. 47, Ex. A, at 9; Dkt. No. 69, at 14.)

Shortly before the start of the December 18, 2019 hearing, the Court provided the parties with the following preliminary construction: “signals applied to affect the direct current balance of a signal.”

(1) The Parties’ Positions

Plaintiff argues that a person of ordinary skill in the art “would understand the scope of the term ‘direct current balancing control signals’ with reasonable certainty because the ’044 patent provides explicit examples of them” and because “the specification also discusses direct current balancing control signals in multiple areas of the ’044 patent.” (Dkt. No. 59, at 25 & 26.) Moreover, Plaintiff argues, “[e]ven without the explicit examples, a PHOSITA would have already

understood how those control signals can be incorporated into a pulse width modulated clock signal.” (*Id.*, at 26.)

Defendants respond that this term is indefinite because “it is not a term of art with any well-understood meaning while the specification not only fails to inform its scope, but is also irreconcilable with the claims.” (Dkt. No. 64, at 1.) Defendants argue that the specification disclosure relied upon by Plaintiff merely sets forth a statement of purpose rather than any explanation of what the disputed term means. (*See id.*, at 3–4.) In particular, Defendants argue that the disclosure that “[s]tandard techniques are used to generate and process the DC-balance control signals” is not helpful because “those signals were not a term of art and the specification fails to describe what those signals are, how they work, what information they transmit, or what they look like.” (*Id.*, at 4 (quoting ’044 Patent at 3:24–26).) Also, Defendants submit that “[t]here is no description in the ’044 Patent of how multiple ‘signals’ could be used together to control direct current balance.” (Dkt. No. 64, at 4.) Further, Defendants argue that the specification cannot be reconciled with the claim language because the specification “does not provide any disclosure of incorporating ‘direct current balancing control signal’ into a clock signal using pulse width modulation.” (*Id.*, at 5.) Finally, Defendants argue that “Plaintiff’s brief fails to support or even address its alternative proposal,” which Defendants urge “is so broad that it encompasses *any* digital signal” because “the property of ‘direct current balance’ is inherent to any digital signal.” (*Id.*, at 8.)

Plaintiff replies that the authorities cited by Defendants are distinguishable because “‘direct current balancing control signal’ is comprised of admittedly well-understood phrases and does not arbitrarily exclude signals that the term would otherwise cover” and because “the inventors provide examples of DC balancing control signals as signals that maintain DC-balance, increase DC-

balance, or decrease DC-balance, and describe that standard techniques are used to generate and process the DC-balance control signals.” (Dkt. No. 67, at 8 (citing ’044 Patent at 3:18–28).) Plaintiff submits that if the disputed term is not construed to have its plain meaning, then “the phrase ‘associated with’ best affords the term with an appropriately broad construction.” (*Id.*, at 10.)

In its supplemental reply, Plaintiff argues: “Defendants and Dr. Holberg [(Defendants’ expert)] incorrectly contend that this term is indefinite merely because it is ‘not a term of art’ and because (in their view) the specification does not provide sufficient detail on how the control signals are generated, how they purport to control or maintain DC balance, or how such signals are processed. Each of these arguments is flawed.” (Dkt. No. 79, at 5–6.) Plaintiff submits that “[i]mplementation details and design choices such as these are not required for a claim to survive an indefiniteness challenge.” (*Id.*, at 6 (citations omitted).)

At the December 18, 2019 hearing, Defendants reiterated their arguments that the disputed term is not a term of art with any commonly understood meaning, is not described in the specification in any meaningful way, and is not even understood by the named inventors.

(2) Analysis

“[T]he parties agree that the concept of ‘direct current balance’ (or ‘DC balance’) alone is well understood in the art and refers to having the same number of 0s and 1s in a signal.” (Dkt. No. 64, at 2.)

As a threshold matter, Defendants submit deposition testimony of two of the named inventors, Gyudong Kim and Min-Kyu Kim, in which the inventors were purportedly unable to articulate any specific meaning for this disputed term. (*See* Dkt. No. 64, Ex. 1, Aug. 21, 2019 G. Kim dep. at 163:21–164:17, 169:15–170:4, 177:21–178:4 & 180:7–181:16; *see also id.*, Ex. 2,

Sept. 10, 2019 M. Kim dep. at 24:10–25:22, 54:23–55:4 & 93:5–94:18.) Plaintiff counters by citing testimony that the disputed term purportedly has meaning. (*See* Dkt. No. 67, Ex. G, Sept. 10, 2019 M. Kim dep. at 24:10–29:21, 53:3–11 & 91:24–94:6; *see also id.*, Ex. H, Aug. 21, 2019 G. Kim dep. at 152:4–153:16, 161:10–171:5 & 176:7–182:16.)

This testimony of named inventors is of little, if any, relevance in these claim construction proceedings. *See Howmedica*, 540 F.3d at 1346–47 (noting that inventor testimony is “limited by the fact that an inventor understands the invention but may not understand the claims, which are typically drafted by the attorney prosecuting the patent application”).

Further, this testimony lacks clarity, revealing no clear persuasive value as to definiteness or indefiniteness. *See, e.g.*, Dkt. No. 67, Ex. H, Aug. 21, 2019 G. Kim dep. at 164:22–165:11 (“This DC balancing control signal is either we -- we achieve the DC balancing or intentionally break the DC balancing.”); *id.*, Ex. G, Sept. 10, 2019 M. Kim dep. at 26:12–15 & 28:22–25 (“the ‘DC balance control’ term can be those additional bits adding of the opposite polarity to compensate and make the DC balance close to the 0.5”).) To whatever extent this testimony is relevant, this testimony is not dispositive of whether the disputed term has a reasonably clear meaning in the relevant art. Even in the authority cited by Defendants, the challengers cited inventor testimony “[w]hile acknowledging that it is not dispositive on the issue of indefiniteness.” *Inguran, LLC v. ABS Global, Inc.*, No. 17-CV-446-WMC, 2019 WL 943515, at *6 (W.D. Wis. Feb. 26, 2019) (finding a term indefinite in part because the lead inventor testified he did not know what the term meant); *see id.* at *6–*8; *see also* Dkt. No. 64, at 7 (citing *Inguran*).

Further, Plaintiff notes that, in separate litigation regarding the patents-in-suit in the District of Delaware, the defendants have not asserted indefiniteness as to the term “direct current balancing control signals.” Instead, the defendants there propose that the term means “signals used

to select a pulse width to direct current balance.” *Super Interconnect Techs. LLC v. HP, Inc.*, No. 1:19-CV-169, Dkt. No. 43, at 7 (D. Del.). This position of the defendants in other litigation is of minimal, if any, probative weight as to the parties’ arguments in the present case.⁶

Turning to the present case and the patents-in-suit, the disputed term appears in all three of the independent claims of the ’044 Patent. Claim 1 of the ’044 Patent, for example, recites (emphasis added):

1. A signal transmitter, comprising:
a channel node to interface with a single direct current balanced differential channel; and
circuitry connected to the channel node, the circuitry being configured to multiplex clock, data and control signals and apply them to the channel node, wherein the clock signal is pulse width modulated to incorporate *direct current balancing control signals*.

The specification discloses that “DC-balancing control signals” can be incorporated into a signal so as to compensate for DC imbalances:

⁶ Defendants cite the indefiniteness analysis of courts regarding other terms in other patents, but these citations are not persuasive here (*see* Dkt. No. 64, at 1–2):

Courts have routinely found terms indefinite when they are not terms of art with well-understood meanings and the intrinsic record fails to clarify their meaning. For example, in *Capital Security Systems, Inc. v. NCR Corp.*, the Federal Circuit found the term “transactional operator” indefinite because it had “no commonly-accepted definition and its scope is unclear in view of the intrinsic evidence.” 725 F. App’x 952, 958–59 (Fed. Cir. 2018). The Federal Circuit reasoned that while it was at least clear that the “transactional operator” referred to a computer, beyond that, it was indeterminable which components described in the specification were part of the “transactional operator” computer. *Id.* As another example, a Delaware court found the term “needs analysis algorithm” indefinite because it “has no plain and ordinary meaning in the relevant art.” *Kaavo Inc. v. Amazon.com Inc.*, No. 14-353-LPS-CJB, 2018 WL 3025040, at *3 (D. Del. Jun. 18, 2018). The court reasoned that “[w]hile Plaintiff’s expert opines that a POSA would ‘be able to understand the scope of the invention with reasonable certainty’, she does not identify the purported ‘plain and ordinary meaning.’” *Id.* The court also found that the specification provided “insufficient guidance to allow a POSA to assess what ‘needs’ or ‘analysis’ is covered by the claimed ‘algorithm,’ or what specific algorithm could be used.” *Id.*

By way of example, the invention may be implemented by varying the falling edge of the clock signal. As shown in FIG. 2A, data are encoded as a variation of the clock falling edge position, while the position of the rising edge is fixed. The periodic occurrence of the rising edges enables easy extraction of the clock signal, from which the receiver can generate the “dot-clock” simply by dividing down the incoming signal (e.g., by 18) with no further clock recovery mechanism. The modulation of the falling edge position or the clock pulse width allows one to embed data and control signals in the clock, therefore reducing the pin count.

U.S. Pat. No. 6,463,092 (the ‘092 patent) utilizes a pulse width modulation technique of this type. The current invention builds upon the disclosed scheme of the ‘092 patent to achieve DC-balancing. In one embodiment, DC-balancing is achieved by inserting *DC-balancing control signals* into the serial link. The *DC-balancing control signals* may include signals to maintain DC-balance, increase DC-balance, and decrease DC-balance. Standard techniques are used to generate and process the *DC-balance control signals*. An aspect of the invention is directed toward incorporating the *DC-balance control signals* into a single serial link along with clock and data signals.

In one embodiment of the invention, the bit “0” is coded as a 50% duty cycle clock, indicating that no changes are necessary to keep balance. On the other hand, the bit “1” is coded as either a 25% or a 75% duty cycle clock, denoted as “1–” and “1+”, respectively, in FIG. 2(a). *Whether to use a 25% or a 75% duty cycle is determined by the DC value of the bits transmitted so far.* If the DC value is lower than nominal, the bit “1” is coded as 75%, and vice versa. With this encoding, the maximum disparity counted in unit pulse length (i.e., 25% pulse width) is only 2 and good DC-balance is achieved.

’044 Patent at 3:4–38 (emphasis added); *see id.* at 3:48–52 (“the control signals can be transmitted without requiring any additional channels”; “the invention leverages the DE 0 state (when data is not being sent) to send DC-balance and other control information on a single channel”).

The ’044 Patent also incorporates-by-reference the ’092 Patent (’044 Patent at 3:15–18), and the ’092 Patent discusses using pulse width modulation to incorporate signals. *See, e.g.,* ’092 Patent at 4:27–33. Based on the foregoing, the intrinsic evidence thus provides sufficient context for understanding incorporating “direct current balancing control signal” into a clock signal using pulse width modulation. At the December 18, 2019 hearing, Defendants argued that there is no linkage between the above-reproduced paragraph regarding duty cycles and the preceding

paragraph referring to “DC-balancing control signals.” At a minimum, however, the reference to “DC value” links the latter paragraph to the discussion of “DC-balancing control signals” in the preceding paragraph.

The specification thus describes how DC balance can be controlled, such as by inserting particular control signals that affect DC balance, and a person of ordinary skill in the art would understand the term “direct current balancing control signals” in this context. The opinions of Plaintiff’s expert are persuasive in this regard. (Dkt. No. 59, Ex. D, Aug. 14, 2019 Fayed Report, at 18–20.) The contrary opinions of Defendants’ expert are unpersuasive. (*See* Dkt. No. 64-1, Oct. 15, 2019 Holberg Decl., at ¶ 61 (“[A]lthough the paragraph at column 3, lines 15 to 29 [of the ’044 Patent] excerpted above incorporates the pulse width modulation technique of the ’092 Patent, the rest of the paragraph’s description of ‘DC-balancing control signals’ does not state that those signals are then used to modulate the ‘clock signal’ or any other signal.”); *see also id.* at ¶¶ 54–64 & 66.)

The Court therefore hereby expressly rejects Defendants’ indefiniteness argument. As to the proper construction, the parties’ arguments demonstrate that construction is appropriate to clarify the meaning of “control” in this context. Plaintiff’s alternative proposal replaces “control” with “associated with” but otherwise merely rearranges the words of the disputed term. The meaning of Plaintiff’s alternative proposal of “associated with” is not clear. Instead, the above-discussed intrinsic evidence demonstrates that direct current balancing control signals are signals applied to a signal to affect the direct current balance of that signal. Construing the disputed term in a manner consistent with the above-reproduced disclosures is particularly appropriate here because, as the parties agreed at the December 18, 2019 hearing, the disputed term as a whole has no well-established meaning in the relevant art. *See Intervet Inc. v. Merial Ltd.*, 617 F.3d 1282,

1287 (Fed. Cir. 2010) (citing *Phillips*, 415 F.3d at 1315) (“Idiosyncratic language, highly technical terms, or terms coined by the inventor are best understood by reference to the specification.”).

At the December 18, 2019 hearing, Plaintiff agreed with the Court’s preliminary construction but also suggested modifying it by replacing “applied to affect” with “designed to affect.” Defendants agreed that, if the Court rejects Defendants’ indefiniteness arguments, then replacing “applied to affect” with “designed to affect” would improve the Court’s construction.

The Court accordingly hereby construes **“direct current balancing control signals”** to mean **“signals designed to affect the direct current balance of a signal.”**

VIII. CONCLUSION

The Court adopts the constructions set forth in this opinion for the disputed terms of the patents-in-suit, and in reaching conclusions the Court has considered extrinsic evidence. The Court’s constructions thus include subsidiary findings of fact based upon the extrinsic evidence presented by the parties in these claim construction proceedings. *See Teva*, 135 S. Ct. at 841.

The parties are ordered that they may not refer, directly or indirectly, to each other’s claim construction positions in the presence of the jury. Likewise, the parties are ordered to refrain from mentioning any portion of this opinion, other than the actual definitions adopted by the Court, in the presence of the jury. Any reference to claim construction proceedings is limited to informing the jury of the definitions adopted by the Court.

SIGNED this 5th day of January, 2020.


ROY S. PAYNE
UNITED STATES MAGISTRATE JUDGE